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Optimizing Tuna Fish Quality through a Science-Based Sustainable Partnership Approach and Ecological Management in Boneoge Village, Central Sulawesi

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Abstract: The potential of tuna resources is quite large, but to achieve export quality, fishermen and Fish Processing Units (UPI) must implement a strict quality assurance system, and government involvement is needed so that the tuna export process from Boneoge Village can be realized soon. This study aims to analyze partnership strategies that can be applied to improve the quality of tuna in Boneoge Village. Data collection method was carried out by *purposive sampling*. Basically, the data in this study were obtained and collected through triangulation (multi-method). The respondents selected in this study were ten people consisting of four fishermen, *Quality Control* and employees of the Fish Processing Unit (UPI), four related institutions. The data analysis used was SWOT analysis followed by QSPM analysis. Based on the SWOT analysis, there are 7 strategies that can improve the quality of partnership-based tuna in Boneoge Village, Donggala Regency. Based on the QSPM analysis, the first priority strategy is the strategy of Building Partnerships through Empowerment between the Government, UPI and Fishermen with a TAS value of 7.24, the second priority is Training in Fishermen and UPI Skills and Bureaucratic Efficiency with a TAS value of 6.27, the third priority is Improving Product Quality and Safety with a TAS value of 5.89.

Keywords: Partnership; Quality; Tuna

Introduction

Indonesia is one of the largest fish producing countries in the world after China (Apriliana et al., 2024) , with a production contribution of 24 million tons per year (Nawir et al., 2024). Among the various types of fish, tuna has a high economic value both in the domestic and international markets (Rahim et al., 2024). One of the areas that has the potential for developing tuna fisheries is Donggala Regency, Central Sulawesi Province.

In June 2020, the government initiated the first export *of Yellowfin* tuna from Central Sulawesi province to Japan through Garuda Indonesia airline (Bea dan Cukai, 2020). The export was carried out by one of the Fish Processing Units (UPI) at the Donggala Fish Landing Port, Central Sulawesi. This UPI produces fresh whole *Yellowfin tuna,* but the difficulty of obtaining raw materials with the highest quality standards, namely grade A, on an ongoing basis has caused the fish processing unit to be unable to meet buyer demand. Most of the tuna raw materials come from Boneoge Village, Donggala Regency.

Tuna catch production in Donggala Regency based on the PPI Donggala Annual Report, (2022) namely in

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2021 it was 165,878 kg and in 2022 it was 147,037 kg, most of which came from tuna fishermen in Boneoge Village. Although the potential for tuna fish resources is quite large, often the quality of tuna produced by fishermen in Boneoge Village is still not optimal. This is based on observation data in several fish processing units where fishermen sell their catch, namely *Yellowfin* tuna in 2022 had a grade A quality of 34,358 kg, grade B of 47,529 kg, grade C of 23,696 kg, and grade D of 15,631 kg.

Based on the tuna quality data, it can be seen that the tuna produced has significant variations in quality levels, namely grade A 28.35%, grade B 39.21%, grade C 19.55%, and grade D 12.89%. The existence of this variation can indicate differences in fishing practices and post-catch handling carried out by fishermen. In addition, weak markets and limited alternative options in obtaining capital mean that fishermen have no choice but to borrow capital from punggawa (Satria & Li, 2017). Punggawa is the term for the owner of the UPI in Boneoge Village who provides capital to fishermen. This is a challenge for fishermen in Boneoge Village where fishermen are bound by promises to punggawa so that fishermen must sell their catch to the UPI.

Fish Processing Units (UPI) that want to export but do not have an agreement with fishermen find it difficult to obtain a sustainable supply of tuna in the area. This is different from several UPIs that are leaders in Boneoge Village, where they have the opportunity to export if seen from the amount of tuna production in the UPI. However, due to a lack of understanding regarding what needs to be done in order to export, they only sell their products to other areas such as Makassar and Surabaya.

To achieve export grade, it is important for fishermen and UPI to implement a strict quality assurance system and government involvement is needed so that the tuna export process from Boneoge Village can be realized quickly and the Export Notification of Goods (PEB) can be recorded in Central Sulawesi Province. Therefore, it is necessary to apply a sustainable partnership approach based on science and ecological management that can improve the quality of tuna fishery products. Through partnerships between fishermen, Fish Processing Units (UPI) and related governments, it is hoped that they can support the improvement of the economy and society of the wider fishing community, release fishermen's dependence on traditional capital institutions such as punggawa, and a means of achieving fairer and more sustainable development (Asiati Devi & Nawawi, 2016; Zulaika et al., 2024) .

This study aims to analyze partnership strategies that can be applied to improve the quality of tuna in Boneoge Village. The main focus of this study is to identify key factors that can support the success of the partnership, as well as formulate strategic recommendations for stakeholders for the development of sustainable tuna science-based quality and ecological management.

Method

This research was conducted from June 2021 to December 2022 in Boneoge Village. Data collection was carried out using *purposive sampling.* According to Kumara, (2018) , *purposive sampling* is a sampling technique with certain considerations. Basically, the data in this study were obtained and collected through triangulation (multi-method). The data used is data pr i m er And secondary. Primary data was obtained through observation, interviews *and* Focus *Group Discussions* (FGD) while secondary data was collected through searches from various literature studies, statistics of related institutions, journal data and other sources that support this study. The respondents selected in this study were ten people consisting of: (1) Four leaders of tuna fishing groups from Boneoge Village consisting of fishermen who are tied to the owner of the Fish Processing Unit and those who are not tied; (2) *Quality Control* and employees as people who know more about the processes and management in the Boneoge Village fish processing unit; (3) Head of UPT. PPI Donggala, Head of Capture Fisheries Division of the Marine and Fisheries Service of Central Sulawesi Province, Head of Class 1 Fish Quarantine Station Palu and Head of Fisheries Product Quality Control Inspection.

The data analysis used is SWOT analysis followed by QSPM analysis to determine the priority of tuna fish quality improvement strategies through a partnership approach in Boneoge Village, Donggala Regency. The working principle of SWOT analysis is to identify various internal and external environmental factors systematically and continue by formulating them. Then by comparing internal factors, namely strengths *and* weaknesses *with* external factors, namely opportunities *and* threats *(* (Rangkuti, 2006).

The process that must be carried out in making a SWOT analysis so that the decisions obtained are more precise must go through the following stages: (1) The data collection stage is data collection, classification and pre-analysis of external and internal factors; (2) The analysis stage is the creation of internal and external matrices and a SWOT matrix; (3) Decision making stage

The stages of creating the *Internal Strategic Factor Summary* (ISFS) strategic factor matrix and the *External Strategic Factors Summary* (ESFS) strategic factor matrix are as follows:

1) ISFS Matrix

The first step is to determine the factors that are the strengths and weaknesses of the system under study. Strengths refer to positive aspects that support the system, while weaknesses reflect elements that hinder the system's performance. Once the strengths and weaknesses are identified, each factor is given a weight in column 2. These weights are assigned on a scale between 1.0 (very important) to 0.0 (not important), taking into account how much influence the factor has on the overall strategic position of the system. It should be noted that the total sum of all weights given should not exceed 1.00. Next, each factor is assessed or given a rating in column 3. The rating is given on a scale between 1 (poor) to 4 (outstanding), based on the level of influence the factor has on the system. For strength factors, the rating is given positively, meaning that the stronger the factor, the higher the rating given. Conversely, for weaknesses, the greater the weakness, the lower the rating. The next step is to calculate the weighted score by multiplying the weight given in column 2 with the rating given in column 3. The result of this multiplication is recorded in column 4 as the weighted score of each factor. The weighted scores of all strength and weakness factors are then summed up. The total of column 4 gives an overview of the internal condition of the system. If the total weighted score is ≥ 2.5, then the internal condition of the system is considered strong enough to overcome the existing situation. Conversely, if the total score is below 2.5, the system still needs improvement or strengthening. (Rangkuti, 2006).

2) ESFS Matrix

The first step is to identify external factors that pose opportunities and threats to the system. Opportunities include external conditions that can support the development or improvement of the system, while threats include conditions that can hinder or disrupt the system. Once the opportunities and threats are identified, each factor is given a weight in column 2. These weights are given on a scale between 1.0 (very important) to 0.0 (not important), depending on how much influence the factor has on the system's strategic position. The sum total of all weights should not exceed 1.00. The next step is to give a rating for each factor in column 3. The rating is given on a scale of 1 (poor) to 4 (outstanding), depending on the impact it has on the condition of the system. For opportunities, the greater the opportunity, the higher the rating. Conversely, for threats, the greater the threat, the lower the rating value given. After rating, the weighted score is calculated by multiplying the weight in column 2 with the rating in column 3. The result of this multiplication is recorded in column 4 as the weighted score for each factor. The next step is to add up the weighted scores of all opportunity and threat factors. If the total weighted score reaches ≥ 2.5, then the external conditions are considered to be responded to effectively by the system.

Based on the ISFS matrix and ESFS matrix, the current system condition quadrant position can be known. The system position can also be known from the internal-external matrix (IE Matrix).

3) IE Matrix

IE Matrix (internal-external) is a matrix created using internal strength parameters and external influences faced. The purpose of creating an IE matrix is to obtain the current position of the system. The IE matrix has nine cells and is grouped into 3 main cells, namely:

a. *growth and build* strategies.
b. Columns in cells III, V and VII can implement the hold and maintain *strategy*.
c. Columns in cells VI, VIII and IX are harvest and divest *strategies*.

Table 3. Internal-External Matrix

Growth And Built I	Growth And Built II	Hold And Maintain III
Growth And Built IV	Hold And Maintain V	Harvest And Divest VI
Hold And Maintain VII	Harvest And Divest VIII	Harvest And Divest IX

Source: Rangkuti, (2006)

The next step after creating the IE matrix is to create a SWOT matrix that explains various possible alternatives for management strategies. This matrix can produce four sets of possible strategic alternatives (Rangkuti, 2006)namely: (1) SO strategy, this strategy utilizes all strengths to obtain and utilize opportunities as much as possible; (2) ST strategy, this strategy uses elements of strength to overcome threats; (3) WO strategy, this strategy is implemented based on utilizing existing opportunities by minimizing elements of weakness; (4) WT strategy, this strategy is based on defensive activities and seeks to minimize existing weaknesses and avoid threats.

The next stage is decision making, in this stage it is necessary to refer back to the internal external matrix that produces the current system position, by looking at the quadrant position of the system so that the right combination of strategies can be identified.

According to (Suhardi, 2011 ; Haryanto et al., 2023), creating a QSPM Matrix can be done in five stages,

namely: (1) Make a list of important opportunity and threat factors in the left column. Data is taken from the EFI and EFE matrices; (2) Determine the weight *for* each opportunity and threat factor. The weighting method is identical to the EFI and EFE matrices; (3) Determine the attractiveness score (AS) by filling in the choice numbers 1 to 4. A score of 1 means not attractive, a score of 2 means somewhat attractive, a score of 3 means quite attractive, and a score of 4 means very attractive. If a certain factor is considered to have no influence, then it does not need to be scored and this continues in the following columns; (4) Calculate the total attractiveness score (TAS), which is the result of multiplying the weights by the AS. TAS shows the relative attractiveness of each alternative strategy. The higher the TAS score, the higher the alternative strategy (considering only the critical factors in that row); (5) Calculate the total TAS score by adding up all the TAS scores. This total TAS reveals which model is most interesting to implement.

Result and Discussion

Boneoge Village has great potential in the fisheries sector, especially in tuna production the PPI Donggala Annual Report, (2022). However, the quality of tuna produced by local fishermen is still not optimal to meet export market standards. One of the main factors affecting this is the lack of application of adequate fish processing technology. (Mboto et al., 2015), serta the lack of knowledge of fishermen regarding the importance of environmental management and the quality of catches. For this reason, it is necessary to apply a sustainable partnership approach based on science and ecological management that can improve the quality of fishery products, especially tuna.

The use of science, especially in the fields of fisheries biology and food technology, is crucial in improving fish quality. Appropriate post-catch handling technologies, such as cold chain systems and modern technology-based preservation, can ensure that the freshness of fish is maintained until it reaches the market. (Ruan, 2020). In addition, it is important to understand the life cycle, spawning season, and migration patterns of tuna. (Madigan et al., 2017). This information can help fishermen determine the optimal time and location to catch high-quality tuna.

A sustainable approach to marine ecological management is also key to maintaining sustainable tuna stocks. (Nakatsuka, 2020). Environmentally unfriendly fisheries practices, such as overfishing and the use of destructive fishing gear, can disrupt marine ecosystems and cause a decline in fish populations. Therefore, it is necessary to apply ecological principles in the management of catchment areas, such as setting fishing zones, monitoring fish stocks, and using selective and environmentally friendly fishing gear technology (Akia et al., 2023). This will maintain the balance of the marine ecosystem around Boneoge, which in turn will support the sustainability of tuna resources.

Partnerships between different parties in the tuna supply chain enable the transfer of knowledge and technology (Petersson, 2023; Zulaika et al., 2024) , sustainable management practices (Mustaruddin et al., 2024), and can improve the quality of tuna in Boneoge Village. With a partnership-based approach strategy in developing tuna quality, it is hoped that the various parties involved can create added value for the entire supply chain, while maintaining the sustainability of tuna and providing high-quality tuna products so that they can compete in the international market.

Formulation of strategy in developing tuna fish quality based on partnership using SWOT analysis, namely a strategic planning method used to evaluate strengths, weaknesses, opportunities, and threats *in* a business project by identifying internal and external factors that support and do not support achieving these goals.

Internal Factor Analysis

Internal factor analysis was conducted to observe various factors that influence the development of partnership-based tuna fish quality in Boneoge Village, Donggala Regency. These internal factors are existing conditions and environmental conditions that influence the development of partnership-based tuna fish quality. These factors are strengths that can be utilized and at the same time points of weakness that occur at the level of fishermen, Fish Processing Units (UPI) and related governments as follows:

1. Strength

The quantity of tuna catch is adequate. Catch Production Results in 2020 based on the annual report of UPT. PPI Donggala, namely at least 4,982 Kg per month and at most 30,739 Kg per month. The criteria for export eligibility are weighing more than 20 kilograms per fish. Based on the survey results, tuna caught by fishermen weighs >20Kg per fish. According to Laitupa et al., (2023) an adequate catch ensures the availability of sufficient raw materials for processing and marketing needs. Without a stable and sufficient supply, fish processing units cannot operate efficiently, and supply to the market can also be disrupted (Putri & Eriyanti, 2020).

The existence of UPI that has been able to export tuna directly from Central Sulawesi to Japan. PT. Arumia Kharisma Indonesia (AKI) is one of the UPIs in PPI Donggala which has made its first export on June 27, 2019 with 283 kilograms of fresh yellowfin tuna products

transported using Garuda Indonesia's air transportation facilities from Central Sulawesi to Japan (Bea dan Cukai, 2020).

Having supporting infrastructure. Availability of *mini planes,* ice factory, *cool storage,* and fuel tank at PPI Donggala which can support the process of catching and processing fish. As stated in Law Number 45 of 2009 concerning fisheries, the function of the fishing port is as a means for the government and entrepreneurs to support activities related to fishery resources. According to Chen, (2022) the infrastructure in the port can encourage sustainable economic development in the surrounding areas.

2. Weakness

Capital and skills in handling tuna. Fishermen in Boneoge Village usually borrow capital from the retainer before going to sea. This condition causes fishermen to always be tied to the retainer because they do not have savings to pay off the increasing debt. In addition, the handling of fish on board by fishermen is still not good because the fishermen's skills are still minimal. Starting from the *hauling process* which takes quite a long time, the method of killing tuna which is still not right and the comparison of ice use which is not adjusted to the length of the trip and the number of fish. According to Fernos et al., (2023) handling the catch on board is a very important process from the entire journey of fish to consumers. If the handling is not right, the protein contained in the fish will be used by microorganisms to reproduce and reduce the quality of the fish.

Fish Processing Units do not implement GMP and SSOP. GMP (*Good Manufacturing Practices*) and SSOP (*Sanitation Standard Operating Procedures*) are frameworks and guidelines used in the food processing industry including Fish Processing Units (UPI) to ensure the safety, cleanliness, and quality of the products produced. When a UPI does not implement GMP and SSOP properly, various weaknesses and risks related to quality can arise. Arulkumar et al., (2023) explained that without good hygiene practices, the risk of cross-contamination between products can increase. This can lead to the spread of harmful microorganisms as well as reduce consumer satisfaction and harm the company's reputation.

Complicated bureaucracy. The government concerned often has a slow and bureaucratic administrative process that can hinder policy implementation. The community considers that in implementing policies and assistance, the government in socializing this is often uneven. According to Araafi et al., (2024) inequality in government assistance has a serious impact on social and economic inequality. This can exacerbate gaps between community groups, hinder inclusive economic growth, and disrupt social stability.

Internal environmental factors include strengths and weaknesses in the development of partnership-based tuna fish quality in Boneoge Village, Donggala Regency. Analysis of internal determinants was carried out using the ISFS matrix to obtain weights, ratings and weighted values (David, 2015). The results of the evaluation of internal strategic factors can be seen in Table 4 as follows.

Table 4. ISFS Matrix Analysis

Internal factors	Weight	Rating	Score
Strength			
The amount of tuna catch is sufficient	0.20	4	0.8
The existence of UPI which has been able to export	0.15	3	0.45
Have supporting infrastructure	0.13	3	0.39
Total *Strength*			1.60
Weakness			
Capital and skills in handling tuna fish	0.25	2	0.5
UPI does not implement GMP and SSOP properly	0.20	2	0.4
Complicated bureaucracy	0.07	1	0.07
Total *Weakness*			0.97
Total ISFS	1.00		2.61

Table 4. presents the *Internal Strategic Factors Analysis Summary* (ISFS) matrix. Based on the ISFS matrix, it is known that in the development of partnership-based tuna fish quality in Boneoge Village, it has a score of 2.61. This shows that the internal conditions of the system still have the strength to overcome the problems faced.

External Factor Analysis

External factor analysis was conducted to observe various factors that influence the development of partnership-based tuna fish quality in Boneoge Village, Donggala Regency. These internal factors are existing conditions and environmental conditions that influence the development of partnership-based tuna fish quality. These factors are opportunities that can be utilized and at the same time points of threat that occur at the level of related institutions, fishermen and Fish Processing Units (UPI) as follows:

1. Opportunity

Increasing market demand. The growth of domestic and international markets for high-quality tuna is very high. It is estimated that by 2030 the global market value of tuna could reach US$ 51.25 billion or Rp. 791,631,352,926,192.8813, recorded at a CAGR during

the estimated period of 2023-2030 (Nursya'ban et al., 2024). This is an opportunity for tuna fishermen to increase their catch.

Local Government Support for Exporters. The government in this case is the Central Sulawesi DKP, Donggala PPI, Palu Class I BKIPM and Pantoloan Customs have provided assistance, support in accelerating the realization of tuna exports from Palu City to Japan so that exporters who have fish processing units feel helped and have the opportunity to carry out further exports. According to Hutabarat & Yulia, (2024) To support the strengthening of the national economy, local governments need to participate and take part in the Empowerment and Support program for MSMEs (Micro, Small and Medium Enterprises), especially in the process of MSMEs carrying out import and export activities.

Cross-sector coordination team. The team was formed with the aim of improving efficiency, speed, and coordination between various sectors involved in the fishery product export value chain. The team can help overcome trade barriers, improve the quality of fishery products, improve infrastructure and logistics, and ensure compliance with applicable international regulations to achieve common goals in developing the quality and export of fishery commodities.

2. Threat

Bad Weather. The threat of bad weather has a significant impact on tuna fishing activities and their safety at sea. Bad weather such as storms, high waves and strong winds can cause serious disruption to tuna fishing operations, preventing fishermen from going to sea. (N'Souvi et al., 2024)

Transportation and Logistics Constraints. High transportation costs, especially shipping by air from Central Sulawesi to Japan, can increase the total export costs where the plane must transit in Jakarta before it can go to Japan. According to the Operations Manager of PT. Arumia Karisma Indonesia, the difference in shipping costs if the plane must transit in Jakarta is 2.6 US dollars per kilogram, while if the plane goes directly to Japan, the shipping cost is 1.4 US dollars per kilogram. Limited local infrastructure such as inefficient ports and inadequate storage facilities also hinder the export process.

Limited Funding. Government budget constraints are one of the main threats faced by local governments in their efforts to support tuna product exports. Budget constraints can affect various important aspects needed to support exports, including infrastructure, training, and promotion. According to Nahampun et al., (2022), there needs to be economic diplomacy carried out by the government by involving the private sector, this plays an important role in securing the Indonesian tuna market globally.

Environmental factors include opportunities and threats in the development of partnership-based tuna fish quality in Boneoge Village, Donggala Regency. Analysis of external determinants was carried out using the EFAS matrix to obtain weights, ratings and weighted values (David, 2015). The results of the evaluation of external strategic factors can be seen in Table 5.

Table 5. ESFS Matrix Analysis

External Factors	Weight	Rating	Score
Opportunity			
Increasing Market Demand	0.25	3	0.75
Local Government Support for Exporters	0.20	4	0.8
Cross-sector coordination team	0.12	2	0.24
Total *Opportunity*			1.38
Threat			
Bad weather	0.20	2	0.4
Transportation and Logistics Constraints	0.15	1	0.15
Limited Funding	0.08	3	0.24
Total *Threat*			0.79
Total ESFS	1.00		2.58

External Strategic Factors Analysis Summary (ESFS) matrix (Table 5) has a score of 2.58. This means that the threat from the partnership-based tuna fish quality development system in Boneoge Village can still be overcome by utilizing existing opportunities. The next step is to create an IE SWOT matrix using the ISFS and ESFS values.

Internal-External (IE) Matrix

The IE matrix is a matrix used to determine the position of the partnership-based tuna fish quality development system. Knowing this position is very important to determine the strategy to be determined. The following is the position of the partnership-based tuna fish quality development system in Boneoge Village, Donggala Regency, which is presented in the IE matrix.

Table 6. IE Matrix Analysis (Internal-External)

I	II	III
IV	V	VI
VII	VIII	IX

Based on the IE matrix above, it can be seen that the position of partnership-based tuna fish quality development in Boneoge Village, Donggala Regency is in cell five (V). Based on Rangkuti, (2006) , being in this cell indicates that the system is in a *growth position* (concentration through horizontal integration) and

stability (caution). This means that the position of the tuna fish quality development system has been carried out, but efforts are needed to improve the development of partnership-based tuna fish quality by minimizing weaknesses and overcoming threats faced, so that the quality of tuna fish in Boneoge Village, Donggala Regency has the best quality and can be accepted in the global market. These improvement efforts can be carried out using the WO and ST strategies as follows.

Table 7. SWOT Matrix

FAKTOR INTERNAL / FAKTOR EKSTERNAL	STRENGTH (S)	WEAKNESSES (W)
	1. The amount of tuna catch is sufficient 2. The existence of UPI which has been able to export 3. Have supporting infrastructure	1. Capital and skills in handling tuna fish 2. UPI does not implement GMP and SSOP properly 3. Complicated bureaucracy
OPPORTUNITY (O) 1. Increasing market demand 2. Local Government Support for Exporters 3. Cross-sector coordination team	SO STRATEGY: 1. Optimizing production to meet market demand 2. Strengthening Cross-Sector Coordination for Better Synergy	WO STRATEGY: 1. Building partnerships through empowerment between the Government, UPI and Fishermen 2. Fishermen and UPI skills training and bureaucratic efficiency.
THREAT (T) 1. Bad weather 2. Transportation and Logistics Constraints 3. Limited funding	ST STRATEGY: 1. Formation of active fishermen groups 2. Product Quality and Safety Improvement	WT STRATEGY: 1. Improving Access to Funding

The results of the SWOT analysis of the fresh tuna fish handling system at the PPI Donggala *hand line fishermen* produced four combinations of SO strategies, ST strategies, WO strategies and WT strategies. The combination of these strategies are:

1. SO Strategy

Optimizing Production to meet market demand. Optimize the amount of tuna catch by increasing production capacity and improving the quality assurance system of the fish processing unit in Boneoge Village by reflecting on the Fish Processing Unit (UPI) which has been able to export. With adequate infrastructure support, the local government must embrace officials who have UPI to handle tuna according to international standards to meet export market requirements.

Strengthening Cross-Sector Coordination for Better Synergy. Activate cross-sector coordination teams involving fishermen, UPI, and local governments to plan and implement integrated export strategies. With good coordination, various parties can work together effectively to overcome obstacles and take advantage of opportunities, increasing the competitiveness of tuna products in the international market.

2. ST Strategy

Formation of active fishermen groups. When bad weather occurs, the central government and local governments will provide support to fishermen in the form of incentives, financing, and facilities that support business development in accordance with Law No. 7/2016 concerning the protection and empowerment of fishermen, fish farmers, and salt farmers from the risk of natural disasters, climate change and environmental pollution. Therefore, fishermen need to form groups and be active in local government activities so that the assistance provided can be evenly distributed considering the threat of limited funds and the distribution of assistance, one of the requirements of which is an active fishermen group. It is important for the government to design a transparent, efficient, and fair assistance program, as well as to carry out ongoing monitoring and evaluation to ensure that the assistance actually reaches those who are eligible.

Improving Product Quality and Safety. Improving the quality and safety of tuna fish products to meet high quality standards from other countries can be done by improving the facilities and infrastructure available to fishermen and Fish Processing Units and increasing promotion and marketing so that tuna in Boneoge Village can be well-known in local, national and even international markets. By utilizing the adequate strength of tuna fish, improving quality and safety is expected to increase sales results so that it can cover the threat of high transportation costs. The more shipments there are, the more transportation costs can be minimized.

3. WO Strategy

Building partnerships through empowerment between the Government, UPI and Fishermen.

Partnership is cooperation in business relations, either directly or indirectly based on the principle of mutual need, trust, strengthening and benefit as regulated in Article 1, point 4 of Law No. 20 of 2008. Rubio et al., (2024) in their research stated that the most important adaptation action to maintain sustainable fisheries is joint management between the private sector, government, and fisheries actors in this case fishermen. Meanwhile, empowerment is a concept that explains various efforts to strengthen a person's position through the development of individual awareness and abilities. Empowerment emphasizes that a person can gain sufficient skills, knowledge, and power to influence his/her life and others (Asiati & Nawawi, 2016). In building partnerships through empowerment between the Government, UPI and Fishermen, each party has a role and function according to its capacity. The government plays a role in making policies and implementing programs, monitoring and evaluating the implementation of the partnership. UPI plays an important role in implementing quality standards, including the implementation of *Good Manufacturing Practices* (GMP) and *Sanitation Standard Operating Procedures* (SSOP), to ensure that the products produced meet domestic and international market requirements. Fishermen have an important role in providing quality raw materials to ensure the continuity of fish processing unit operations and meet market demand (Fatma, 2015).

Fishermen's skills training and UPI and bureaucratic efficiency. In improving the quality of tuna produced, it is necessary to have fishermen's skills training and training in the internationally applicable quality assurance system, in this case *the Hazard Analysis and Critical Control Points* (HACCP) so that the fish products produced meet the established quality standards (Nurfadillah et al., 2022). Improving fishermen's skills is carried out by training three fishermen per group of fishermen who will be guided and assisted by experts until they understand the quality of fish and how to handle it properly. The goal is that each group of fishermen has three people who can supervise and inform others when handling tuna on board. Meanwhile, bureaucratic efficiency is carried out by utilizing a cross-sector coordination team to identify and simplify complicated bureaucratic procedures.

4. WT Strategy

Increasing access to funding. Collaboration with financial institutions or non-governmental organizations that can help increase access to funding. According to (Nahampun et al., 2022)there needs to be economic diplomacy carried out by the government by involving the private sector, this plays an important role in securing the Indonesian tuna market globally. Generally, fishermen are constrained by capital due to the lack of a savings culture (Karthikeyan, 2018) . Organizing socialization and education programs for fishermen about the importance of saving can help fishermen manage capital wisely. Providing loan facilities with low interest from financial institutions to UPI and fishermen so that they can improve their facilities so that the quality of the fish produced can meet export grade.

Priority Strategy for Developing Tuna Fish Quality Based on Partnership with QSPM Analysis

To determine the priority of partnership-based tuna fish quality improvement strategies in Boneoge Village, Donggala Regency, a QSPM analysis was carried out. This analysis is a continuation of the SWOT analysis as a stage in decision making. Alternative strategies obtained from the SWOT analysis are then recalculated by determining the relative interest value (AS). The strategy with the highest total relative interest value (TAS) becomes the priority strategy. The results of the QSPM analysis in partnership-based tuna fish development in Boneoge Village, Donggala Regency can be seen in Table 8.

Table 8. QSPM Analysis of Partnership-Based Tuna Fish Quality Development

Alternative Strategy	TAS Value	Priority
Optimizing Production to meet market demand (SO-1)	5.73	4
Strengthening Cross-Sector Coordination for Better Synergy (SO-2)	5.19	6
Formation of active fishermen groups (ST-1)	5.48	5
Product Quality and Safety Improvement (ST-2)	5.89	3
Building partnerships through empowerment between the Government, UPI and Fishermen (WO-1)	7.24	1
Fishermen and UPI skills training and bureaucratic efficiency (WO-2)	6.27	2
Improving access to funding (WT-1)	4.35	7

From the results of the QSPM analysis in the table above, it was found that of the seven alternative strategies in developing the quality of tuna fish based on partnerships in Boneoge Village, Donggala Regency, the priority strategy is the strategy of building partnerships through empowerment between the Government, UPI and Fishermen with the highest TAS value of 7.24. This strategy is the main concern of most respondents because there is no synergy between fishermen and the

government regarding the quality of tuna fish. Synergy between UPI and fishermen has also not been established where UPI has low quality human resources so that there needs to be a transfer of knowledge from UPI to fishermen such as knowledge regarding determining the grade of tuna fish. According to fishermen, the quality of tuna meat obtained has nothing to do with the fishing method they use so that fishermen do not really care about the type of grade they get. In addition, the government, fishermen, and the business world are still concentrated on solving the problems they each face. Synergy between the Government and UPI has also not been established where in carrying out exports it seems very difficult to coordinate between local governments, export business actors and airlines.

Through empowerment in the form of training, the government can grow awareness, skills and abilities of fishermen and UPI in improving the quality of tuna in Boneoge Village. Building partnerships through empowerment can also strengthen fishermen, UPI and related governments in participating, controlling, and influencing institutions that will have an impact on the quality of tuna in Boneoge Village. According to Rejo et al., (2024) the concept of empowerment can meet basic needs and provide a mechanism to prevent impoverishment in the future and increase the income of fishing communities.

The second strategic priority is training in skills for fishermen and UPI as well as bureaucratic efficiency. with a TAS value of 6.27. This strategy is carried out by training three fishermen per group of fishermen who will be guided and assisted by experts until they understand the quality of fish and how to handle it properly. Meanwhile, fish processing units are required to have *Quality Control* (QC) that has a HACCP certificate. Bureaucratic efficiency can be achieved by forming a Cross-Sector Coordination Team.

The third strategic priority is Improving Product Quality and Safety with a TAS value of 5.89. This strategy is carried out by improving the facilities and infrastructure available to fishermen and Fish Processing Units and increasing promotion and marketing so that tuna in Boneoge Village can be well-known in local, national and even international markets. Improvements in facilities and infrastructure include the use of *tuna rings* to reduce physical fatigue of fish due to resistance during *hauling.* The use of *killing spikes* to stop reflex movements in tuna. Coating the ship's deck with foam carpet to avoid injury to fish skin. The steps for implementing the strategic priorities and their implementers can be seen in Table 9.

Table 9. Implementation of Strategy Priorities and Strategy Implementers

Strategic Priorities	Solution	Executor
Building partnerships through empowerment between the Government, UPI and Fishermen	a) The government identified the main needs of partners in this case fishermen and Fish Processing Units. b) Making cooperation agreements between partners c) Empowering partners	a) Government institutions b) Fish Processing Unit c) Fisherman
Fishermen and UPI skills training and bureaucratic efficiency	a) training and HACCP training for UPI b) Formation of a cross-sector coordination team	a) Relevant government agencies
Product Quality and Safety Improvement	a) Improve existing facilities and infrastructure for fishermen and fish processing units b) Increase promotion and marketing	a) Government institutions b) Fish Processing Unit c) Fisherman

Conclusion

Based on the SWOT analysis, there are 7 strategies that can improve the quality of partnership-based tuna fish in Boneoge Village, Donggala Regency. Based on the QSPM analysis, the first priority strategy is the strategy of Building Partnerships through Empowerment between the Government, UPI and Fishermen with a TAS value of 7.24, the second priority is Training of Fishermen and UPI Skills and Bureaucratic Efficiency with a TAS value of 6.27, the third priority is Improving Product Quality and Safety with a TAS value of 5.89.

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